

APPLICATION FOR UNITED STATES PATENT

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TITLE: REMOVABLE DATA RECORDING DEVICE WITH
HERMETIC, REMOVABLE AND SUSPENDED CARTRIDGE
AND RECEPTACLE THEREFOR

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SUBSTITUTE SPECIFICATION

**Removable Data Recording Device with Hermetic, Removable and Suspended
Cartridge
and Receptacle Therefor**

[01] This application claims the priority of French Application No. 99-08306 filed

5 June 7, 1999.

[02] BACKGROUND OF THE INVENTION

[03] Field of the Invention

[04] This invention relates to the ~~technical sector of~~ devices for data recording (and storage) in a severe environment and, In a particular, ~~particularly but in a nonrestrictive~~
10 ~~manner~~ non-limiting example, it pertains to devices intended to equip ~~airliners, airplanes;~~
~~combat aircraft;~~ ships; helicopters; combat vehicles ~~such as~~, for example, armored
vehicles; spacecraft; and similar equipment.

[05] This invention relates to the storage and recording of all types of data, ~~that for~~
~~is~~ example, numerical, audio and especially video data ~~in a nonrestrictive fashion, however,~~
15 ~~and including~~ includes types of data that ~~can~~ may appear in the future.

[06] Background

[07] In this general context, ~~we are familiar with~~ storage and recording on magnetic tape,
~~but we prefer~~ is included, but, in a preferred embodiment, data storage and recording is in
a "cartridge," that is to say, a hermetically sealed box, for example, a hard disk with its
20 reading and recording device, comprising an "arm" in the conventional fashion.

[08] ~~The hard~~ Hard disks ~~concerned here are,~~ as used herein, include those that are
~~sold~~ currently available, especially disks with a format of 22" or 32", as usual, or any other
hard disk or similar system that could appear in the future.

[09] As ~~the~~persons ~~experts~~skilled in the ~~field~~art will understand, the invention also applies to any other data storage and recording support that is contained in ~~the~~a box that must be hermetically sealed and that must be handled so as to be extracted from its housing after a given mission or operation and that must then be reinserted in that same housing for
5 the next mission or operation.

[10] ~~In this connection, we will also cite in a nonrestrictive manner the~~Also included within the scope of such devices are semiconductor memories and any other technology having an equivalent, current or future function.

[11] ~~By "hermetic," we mean~~Hermetic" means here the vacuum-tight elements, that is
10 to say, those that have a zero or extremely low leakage rate in a vacuum environment or under very low ambient pressure.

[12] ~~By "tight, Tight" we mean~~means watertight or humidity-tight elements.

[13] In the above-mentioned environments, the equipment ~~in the well-known fashion is~~
typically subject to difficult or extreme conditions of vibration ~~and/or,~~ vacuum (altitude)
15 and/or shocks and similar constraints.

[14] The most difficult problem to be solved ~~here~~ is the problem of altitude and, ~~hence,~~ the more or less forceful pressure drop to which the equipment will be subjected.

[15] ~~As a matter of fact, pressure~~Pressure differences, when exerted on a non-hermetic device, will bring about incoming and outgoing flows of atmosphere in the box containing
20 the data device and hence produce condensation phenomena. Moreover, in the case where the cartridge contains a hard disk, the arm will not remain at a predetermined distance from the disk, called the aerodynamic distance ~~from the disk, but on the contrary will entail the~~

risk of being placed on the disk and thus scratching it, ~~causing~~resulting in deteriorated recordings.

[16] It is thus necessary to resort to hermetically sealed boxes and boxes that are generally "suspended," that is to say, they are mounted on shock absorbers capable of
5 reducing the shocks and vibrations undergone in the severe environments ~~concerned to~~
~~in~~offensiveacceptable values.

[17] ~~It is~~Data devices must also ~~necessary to~~ have a sufficient number of electrical contacts between the box (cartridge) and its support (receptacle) in the recorder to ensure the necessary transmissions of signals.

10 [18] ~~According~~For example, according to the currently customary data processing standards, one must have about 50 contacts for the IDE standard and 80 for the SCSI standard ~~by way of nonrestrictive examples.~~

[19] However, recorders, especially those mounted in aircraft, must have as small dimensions as possible for obvious reasons of weight and bulk and, thus, the surface area
15 available for contacts is ~~thus~~ reduced. This means that the contacts must themselves have small dimensions.

[20] Another ~~urgent~~ requirement is that ~~said~~ contacts must, without any harmful wear and tear, ~~resist~~withstand a large number of "insertions," that is to say, connection/disconnection cycles ~~and especially,~~ without displaying any wear and tear that
20 would induce parasite resistances that would affect the data. Military-type connectors, ~~which we are familiar with in the field concerned, that is,~~such as the SUB-D or HILC

38999 type, can ~~take~~withstand 200 to 400 insertions. The chip card connectors must withstand about 5,000 insertions.

[21] It is also absolutely necessary that the cartridges be easily handled, that is to say, they must be easily extracted, transported and put back in place without any special precautions nor any special tools ~~and~~, even in a hostile or difficult environment. Thus, the boxes must be capable of being handled by technicians at airport runways, possibly with hands wearing thick gloves, and they must withstand shocks, such as those that result from being dropped, and similar ~~one~~trauma encountered in routine use.

[22] The devices must therefore be compact, light, sturdy, hermetic, easily handled, and, obviously, reliable, ~~they~~. They must present a large number of contacts on as small a surface as possibly and they must be capable of withstanding a large number of insertion cycles, for example, on the order of 3,0003,000, without any damaging wear and tear, ~~and they~~. They must present an extraction and engagement mechanism that itself must be compact, simple, sturdy, ~~obviously~~ reliable, ~~obviously~~ and very precise, especially in terms of electrical contacts, that also must be easily handled, including with gloves, Insertion and this, ~~of course~~, extraction must not require any excessive force (entailing the risk of damaging the shock absorbers). The simple listing of these objectives underscores the difficulty of this undertaking because ~~any~~persons ~~expert~~skilled in the ~~field~~art will understand that practically all of these criteria are antagonistic.

[23] ~~Furthermore, to this very day, there~~ There is no currently available connector capable of meeting all of these criteria. The only connectors that come close to some of these

parameters are connectors for memory cards, but they are infinitely too fragile and absolutely unsuitable for the environments contemplated for the invention.

[24] ~~We also know of connectors~~Connectors called "hermetic lead-through" of the type shown in Figure 1, ~~attached~~are currently known.

5

[25] BRIEF DESCRIPTION OF THE DRAWINGS

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[26] Other features and advantages of the invention will appear more clearly upon reading the following description and referring to the attached drawing where:

[27] ~~Figure 1~~ shows a "hermetic lead-through" contact of ~~the~~the prior art;

15

[28] ~~Figure 2, made up of Figures 2a, 2b and 2c,~~ shows three nonrestrictive examples ~~made for the sake of simplicity in a single figure showing couples of "studs" plugs and of "studs" forming the connection according to the invention;~~

[29] ~~Figure 3, made of up Figures 3a and 3b, shows the final phase involved in~~
illustrates the process of engaging a cartridge 40 in a receptacle 30 ~~with Figure 3a~~
~~corresponding to pre-engaging and Figure 3b showing the completed engagement;~~

20

[30] ~~Figure 4 shows~~illustrates the a way to of mount mounting a stud in the wall of a cartridge 40 according to the invention;

[31] ~~Figure 5 shows a special nonrestrictive means~~illustrates a way for locking the shock absorption of a receptacle 30 in the ~~"cover of a box 70 open"~~position;

[32] ———Figure 6, ~~made up of Figure 6a and 6b, shows the~~ illustrates method used in engaging the pin 120 in sleeve 105 according to the preferred embodiment of the invention;

[33] ———Figure 7 ~~also shows the~~ illustrates an engagement phase process according
5 to the invention.

[34] On the attached figures, the same references have the same meanings, to wit:

[35] 1 female contact (prior art)

[36] 2 male contact or "plug" (prior art)

[37] 3 metallic support or "case" (prior art)

10 [38] 4 hermetic glass welding (prior art)

[39] 5 rear connection of contact, especially toward a printed circuit board not shown

[40] 10 elastic "plug"-type contact of the spring- or piston type according to the invention

15 [41] 11 base of spring plug for mounting on printed circuit in nonrestrictive examples shown

[42] 12 contact of "stud" type according to the invention, intended to cooperate with elastic plug 10

[43] 16 variant of shape of stud 12 according to the invention

20 [44] 18 other variant of shape of ~~stud~~ stud 12 according to the invention

[45] 30 support or "receptacle" of cartridge, incorporating a connection plate 95, comprising plug contacts 10

- [46] 40 cartridge (face bearing connection with "studs" 12 (or 16 or 18 or other variants within the immediate reach of ~~the~~persons expertskilled in the ~~field~~art)
- [47] 45 connection rod for stud 12 (or 16 or 18 or other variants within the immediate reach of ~~the~~persons expertskilled in the ~~field~~art)
- 5 [48] 46 stud head
- [49] 47 stud covering (generally a thin layer of gold)
- [50] 60 stud protection layer (generally resin)
- [51] 70 closing hood of box (opening according to arrow (1))
- [52] 75 "prismatic" piece or cam integral with hood
- 10 [53] 80 rod or other control piece
- [54] 85 mechanical safety unit (containing a return spring)
- [55] 87 axis of rotation along arrows (2) and (3) when the hood is open
- [56] (M) shock and vibration absorption movements of receptacle 30 (only movements perpendicular to the faces of the receptacle are considered here)
- 15 [57] 90 retractable ~~chocks~~chock:
- [58] hood of box 70 closed→→→; chock in high position permitting movements (M) of receptacle 30; hood open→→→; chock in low position blocking movements (M));
- [59] 100 engaging clip of cartridge 40
- 20 [60] 105 ~~glue~~groove for fitting or clipping protuberance 120, preferably semi-cylindrical

[61] 110 piece for engagement of receptacle 40 of cartridge and support of protuberance 120, which is a cylindrical pin in preferred embodiment of the invention

[62] 120 protuberance intended to cooperate with groove 105, which protuberance is a cylindrical pin in a preferred embodiment of the invention

5 [63] 140 "U"-shaped piece, support of protuberance 120, which protuberance is a cylindrical pin in a preferred embodiment of the invention, the "U"-shaped piece 140 being adapted to receive clip 100 and cooperate with it and especially with groove 105

[64] 200 box

[65] 300 shock absorber of receptacle (generally a three-dimensional shock absorber)

10 [66] SUMMARY OF THE INVENTION

[67] In the ~~attached Figure 1 (prior art), we can see that~~ illustrated in Figure 1, to make a single contact, it is necessary to provide a plug 2, cooperating with a female contact 1 (or inversely), the female member having to guide the plug. The assembly is maintained in a support or "case" 3 by means of a hermetic joint 4 formed by a glass welding, that is to say, 15 a hermetic joint obtained by heating the assembly in the known fashion to about 600-700°C until the glass forms a semi-liquid phase, bringing about a tight vacuum ("hermetic") connection upon cooling. The plug 2 and the female contact 1 each are connected to a standard connection device such as a printed circuit or similar device, for example, at 5. The ~~plug~~ plugs ~~have~~ hashave a screwing button that applies a strong insertion or 20 extraction force on the contacts along the longitudinal axis of the connection. Such a force is not compatible with the ~~urgent~~ requirements of the invention according to which the necessary connection force must be weak ~~so as to~~ facilitate handling and, above all, not to

damage the shock absorption systems-~~(in~~. In the devices shown by this invention, the masses, suspended by the shock absorption means, are light and consequently the shock absorbers are flexible; an excessively strong force would damage them ~~irremediably~~irreparably and the device could no longer be suitably suspended, with the obvious serious consequences as regards the reliability of measures and the system). Such known devices, furthermore, have very large dimensions with diameters on the order of a 3 to 5 cm housing with about 40 contacts. Furthermore, they do not make it possible to mechanically ~~to~~ lock the cartridge. For these various reasons, their so-called "insertion" technology is not suitable ~~for the invention~~.

[68] The invention proposes a solution that is not an insertion but rather a "contact" in spite of the contradictory requirements mentioned above.

[69] Generally speaking, the invention relates to a process for making a connection between a cartridge 40, ~~comprising~~that includes a data recording and storage means, and ~~its~~a receptacle 30, characterized in that the connection is made by contact and not by insertion and that the contact is made for each electrical contact by the cooperation of a plug 10 mounted elastically by a means 11 on receptacle 30 and a stud 12, 16 or 18 mounted on cartridge 40.

[70] The advantage inherent in the contact technology is that it eliminates the constraint represented by precision axial guidance that is ~~mandatory~~required in case of insertion as in

Figure 1.

[71] The solution is not obvious because it was also recalled that the problem posed here, among other things, was to provide a light and compact system not requiring a strong cartridge insertion or extraction force and easily handled with gloved hands or the like.

[72] According to the invention, we propose quite generally a data storage or recording
5 device for a severe environment that can possibly be mounted on land vehicles or on ships or aircraft or space vehicles of any type of the kind comprising a recording cartridge 40 (with hard disk or other data support) and a receptacle (or cartridge support) 30 that is "suspended" (that is to say, it is kept in position by preferably multidirectional shock absorbers) the device of the invention includes a recording cartridge (with hard disk or other
10 data support) and a receptacle (or cartridge support) that is "suspended" (that is to say, it is kept in position by preferably multidirectional shock absorbers), characterized in that the connection between the cartridge and its receptacle is made by contact and not by insertion and that the contact for each electrical contact is made by the cooperation of a plug 10 mounted elastically by means 11 on receptacle 30 and a stud 12, 16 or 18 mounted on
15 cartridge 40 in a hermetic manner on the receptacle and a stud mounted on the cartridge in a hermetic manner.

[73] DETAILED DESCRIPTION OF THE INVENTION

[74] The invention is a data storage or recording device for use in a severe environment that can be mounted on land vehicles or on ships or aircraft or space vehicles of any type.

20 The device includes a recording cartridge 40 (with hard disk or other data support) and a receptacle (or cartridge support) 30 that is "suspended" (that is to say, it is kept in position by preferably multidirectional shock absorbers). The connection between the cartridge and

its receptacle is made by contact and not by insertion and the contact for each electrical contact is made by the cooperation of a plug 10, mounted elastically with means 11 (such as a spring or on the a piston receptacle), and a stud 12, 16 or 18 mounted on the cartridge 40 in a hermetic manner.

5 [75] The invention provides a solution that accommodates all of the required parameters with the help of a data storage or recording device for a severe environment that can possibly be mounted on a land vehicle or a ship or an aircraft or a space vehicle of any type, where the device is of the kind comprising that includes a recording cartridge 40 (with hard disk or other data support) and a receptacle (or cartridge support) 30 that is "suspended"

10 (that is to say, it is kept in position by preferably multidirectional shock absorbers); The device is characterized in that:

[76] —the connection between recording cartridge 40 and suspended receptacle 30 is made by as many couples of "plug 10"/"stud 12 or 16 or 18" as there are required contacts;

15 [77] ~~said~~the plugs 10 go through the wall of receptacle 30 and present a protuberant portion with a spherical-~~or~~, rounded or similar shape;

[78] ~~and they~~the plugs 10 are mounted ~~only~~ by an shock absorption and return means 11;

[79] ~~and said~~the studs 12 or 16 or 18 go through the wall of the cartridge box 40 and present a slightly protuberant part with a concave shape 12, with a ~~plane~~plan or shape 16

20 or with a slightly convex shape 18;

[80] ~~said~~the plugs 10 and ~~said~~the studs 12 or 16 or 18 are geometrically adapted in terms of shape and dimension to cooperate and create an effective electrical contact when one makes receptacle 30 and cartridge 40 face each other;

[81] ~~the~~ cartridge 40 and ~~the~~ receptacle 30 ~~comprise~~include an
5 engagement means capable of positioning ~~other~~all such plugs 10 and studs 12, 16, 18 opposite each other so as to make an effective electrical contact and to ensure the mechanical hold of cartridge 40.

[82] ~~The~~Persons ~~expert~~skilled in the ~~field~~art will understand that the shape of the plugs and the studs is not restrictive here and is given only way of illustration. ~~One might~~
10 ~~prefer~~Preferred plugs ~~whose~~have a head ~~will have~~with a generally spherical or rounded shape at the top and studs ~~46 with~~46. Studs having a head that is slightly concave head (Figure 4) (12) or in a less are preferred manner with; studs may also have a flat head (Figure 2b, 16) or in an even less preferred manner a slightly convex (Figure 2e, 18) head
18.

15 [83] Generally speaking, ~~the~~persons ~~expert~~skilled in the ~~field~~art will know how to visualize -- if necessary, by means of routine tests -- the adapted shapes to create an effective electrical contact by means of contact.

[84] ~~In this entire patent application~~As used herein, the terms "plug" and "studs" are intended to designate all of these shapes either described here or accessible to ~~the~~persons
20 ~~expert~~skilled in the ~~field~~art.

[85] As shown in ~~the diagrams in~~ Figure 52 and Figure 2,5, the plugs (and, respectively, the studs) will preferably be positioned in a plate 95 of the receptacle 30 (or, respectively,

of the contact face of the cartridge 40) ~~naturally in a nonrestrictive manner~~. One could provide other devices ~~such that as have~~, for example, several zones of studs and plugs opposite each other, and these and similar arrangements are within the ~~reach~~ knowledge of ~~the persons~~ experts skilled in the ~~field~~ art.

5 [86] Figure 4 shows a preferred manner of assembling the plugs in the wall or contact face of the cartridge 40.

[87] ~~The~~ Accordingly, the invention also relates to a process for mounting the studs according to which stud 12 (or 16 or 18) is positioned by its rod 45 in an adaptive opening in a wall of the receptacle 40 by means of a ~~known~~ glass welding 4 after which ~~one deposits~~
10 ~~around head 46~~ a mold of protective material ~~60-60~~, such as a resin, is deposited around the
head 46.

[88] The stud will preferably be made of metal or an alloy with a very high electric conductivity and it will preferably ~~in the known manner~~ comprise a fine gold coating 47 or a coating of an equivalent metal or alloy promoting electrical contact between the plug and
15 the stud.

[89] As noted earlier, ~~recording the~~ the cartridge 40 is intended to be removed from its support or receptacle 30, for example, upon return from a mission, so that its ~~content~~ contents may be processed. The ~~process~~ cartridge 40 must then be capable of being repositioned ~~on~~ in the its receptacle 30 for the next mission, with as perfect an electrical
20 contact as possible.

[90] The solution to ~~this problem~~the problems in the prior art is not evident because it is advisable perfectly to position the connection arrangement whose contact surface is very small for each ~~stud~~plug/stud couple.

[91] The invention works via engagement/disengagement, performing a complex
5 movement ~~that will be described below.~~

[92] Figure 3 and Figure 7 illustrate examples of processes for engaging the cartridge in the receptacle.

[93] ~~In Figure 3a (and on Figure 7a), we showed~~show the position of the cartridge 40 and receptacle 30 (or cartridge support), just prior to engagement). One can see that cartridge
10 40 ~~is~~has, integral with its lower portion ~~with~~, at least one and preferably at least two (possibly more) clips 100 ~~comprising~~having a groove ~~105~~105. The clips 100 are capable of cooperating by tight fitting with a protuberant part 120 that is integral with an engagement piece 110, 140 in the shape of a "U," which is itself ~~is~~ integral with the receptacle 30, ~~cooperation being~~30. Cooperation between the receptacle 30 and cartridge
15 40 is governed by mechanical means such as the engagement movement of the clip, or clips 100 in the "U" shaped engagement piece 110, 140, leading to "pre-engagement", by a slightly exaggerated descent of the clip of the cartridge with respect to protuberance 120 followed by "final engagement" through the fact that said clip is raised again to lead to a tight fit of the groove 105 and the protuberance 120.

20 [94] The engagement process involves ~~absorbing~~assisting the engaging action by making the clip or clips 100 slide (movement "A," Figure 53a) in the "U" opening of engagement piece 110, 140, seeing to it that groove 105 will descend slightly further down that the

corresponding protuberance 120 (~~Figure~~Figures 3a and 7a) after which one ends the engaging action by putting the contact face of cartridge 40 on the contact face of receptacle 30,30 (movement "B," Figure 3b,) and by allowing the two faces to be positioned via a slight rise (movement "C," Figure 3b) and by tight fitting of groove 105 with protuberance 120 at the end of this rising motion.

[95] According to the preferred embodiment of the invention, protuberance 120 is a cylindrical pin and corresponding groove 105 is a semi-cylindrical groove so adapted as to receive the pin 120 inwith a tight fittingfit. With the help of this term, thepersons expertskilled in the fieldart will understand that there is no leeway after engagement.

[96] Figure 6 illustrates a method of engaging the pin in the groove.

[97] During the above-described engagement action, cylindrical pin 120 initially rests (see Figure 6a) on the edge of groove 105 and the105. (Figure 6a) The compression effort that is applied when the cartridge compresses the plugs causes the pin 120 to roll (see Figure 6b) ininto the center of the groove 105. (Figure 6b).

[98] According to this process, one understands that the slight rise of the cartridge during final engagement, which represents an extremely small distance of about 0.2 to 0.5 mm while each stud comes into contact with each plug, will be expressed by a perfect self-cleaning of the contact surfaces. During this movement, there is no wear and tear that one might fear and that would be damaging; tests showed, on the other hand, that the effective service life of contacts thus self-cleaned was definitely longer than the effective service life of the cartridge.

[99] As also indicated above, it is important that the operator not be forced during the placement of cartridge 40 to apply excessive forces on receptacle 30 that could damage the shock absorbers.

[100] We know that the device made up of the receptacle 30 and the cartridge 40, as well
5 as by various other known elements, are of course understood to be generally contained in a resistant and tight box. Figure 5 shows the positioning of a receptacle 30 in a box 200. One gets at the cartridge, housed in its receptacle, by opening a hood 70 (see Figure 5). 70.

[101] The invention proposes ~~a~~the device that ~~comprises~~include a mechanical means for the temporary automatic locking of ~~{the spring-back}~~ shift (M) of receptacle 30 to protect
10 the shock absorbers 300 during the extraction phase and the phase in which the cartridge is put back in ~~its~~the receptacle.

[102] ~~The~~With reference to Figure 5, a preferred solution involved for use in the invention consists ~~(Figure 5) of~~is a device that ~~comprises~~includes a mechanical means for the temporary automatic locking of the shift (M) of receptacle 30 when one opens a hood 70
15 of the box 200 to gain access to the cartridge, and the same means again permits the normal {spring-back} shift (M) of receptacle 30 during the closing of the hood to, that is to say, after one has put a cartridge back in place by means of engagement on the receptacle.

[103] The importance of locking the shift is that one protects the shock absorbers 300 since they -- regardless of the force that is exerted -- are no longer stressed along direction
20 (M).

[104] Figure 5 shows a particular nonrestrictive means for temporary locking, characterized in that it ~~comprises~~includes a prismatic piece or a cam 75 ~~comprising~~having

an inclined face that is integral with the hood 70 and a retractable chock 90 that is integral with a piece 85 constituting the mechanical safety unit considered, ~~said~~. The piece itself being integral with a control rod 80 or a similar piece capable of cooperating with the cam 75 via contact by sliding on the inclined surface of ~~said~~the cam or prism, ~~the~~. The entire piece forming the chock ~~being~~is mounted in a rotating manner around the longitudinal axis 87 of unit 85, ~~and this assembly comprises~~85. The unit 85 includes a return means such as a spring or a similar device, tending to lower the chock 90 behind the contact face of receptacle 30 and the various geometries, shapes and positioning of the various pieces are adapted so that the opening of the hood 70 (and thus of cam 75) according to movement (1) by sliding would release control rod 80, which then moves due to the action of the return means, not shown, according to movement (2) to which corresponds movement (3) of chock 90, a movement that positions ~~said~~the chock 90 behind the receptacle 30, ~~the~~30. The thickness and positioning of chock 90 ~~being so~~are adapted so that in this position the shock absorption (or spring release shift) movement (M) of the receptacle will be impossible.

[105] One can then return the cartridge in place without the receptacle ~~being able to act on~~hiscontacting the shock absorbers 300 according to movement (M), since that movement is prevented by chock 90 and there is therefore no risk of deforming ~~said~~the shock absorbers, 300.

[106] When one closes the hood again, the inverse movement raises chock 90, which is then positioned above the receptacle, thus again permitting shock absorption movement (M).

[107] According to a nonrestrictive embodiment of the invention, the return force for plugs 10 is on the order of 1 N for each plug.

[108] According to a preferred but nonrestrictive embodiment, the shock absorption or return means 11 for plug 10 is a spring or a piston, preferably a small piston.

5 [109] The system described in Figure 5 can also be used as a detector for the opening of the hood. 70. It is ~~then absolutely necessary~~ that the cartridge no longer be ~~under stress~~ connected to the power supply when one extracts it, ~~but rather, when the cartridge,~~ for. For example, when the cartridge, comprises a disk and an arm, the ~~latter should be stopped~~ arm could stop and ~~should~~ rest on the disk; one can easily understand that the
10 further movements imparted to the cartridge during its transport will be transmitted to the arm, which will damage the disk and the recorded data. On the other hand, if the power supply to the cartridge is cut off prior to extraction, the arm is automatically placed in the so-called "parking" position where it cannot damage the disk.

[110] The system in Figure 5, according to a particular embodiment, comprises a means
15 adapted for automatically cutting the electric power supply to the cartridge when hood 70 is opened.

[111] Such a means, may be for example, ~~will be~~ an opening detection contact of the known type, mounted partly on the hood and partly on the portion of the box containing cartridge receptacle 30.

20 [112] ~~The~~ Persons ~~experts~~ skilled in the ~~field~~ art will know how to visualize other equivalent means.

[113] The invention also relates to applications of devices and processes described for recording and storage of data on the ground or mounted on a land vehicle or a ship or an aircraft or a space vehicle of any type.